

# Programmable Automated Welding Systems

**Status:** Transitioned

## PROBLEM / OBJECTIVE

While many other welding-intensive industries have successfully utilized automation to increase quality and productivity in their operations, shipbuilders have lagged in the utilization of robotic welding. Historically, off-the-shelf commercial welding robots were not designed for the small batch production typical of ship production or the stringent performance requirements required for military ship structures. The Programmable Automated Welding System (PAWS) was developed for the Navy to advance the use of automated welding technology within the nation's shipyards.

## ACCOMPLISHMENTS / PAYOFF

### ***Process Improvement:***

- Increased production efficiency due to replacing manual welds with automatic welds. Such welds would be made more quickly and be of consistently higher quality.
- Reduced cost for integrating automation into a shipyard due to compatibility with current motion devices and welding processes.
- Improved production planning reduces the number of iterations required in the design cycle, and improves communications between design and manufacturing.

### ***Implementation and Technology Transfer:***

General Dynamics, Electric Boat Corporation purchased the Programmable Automated Welding System (PAWS) for their production facility in Quonset Point, RI. This robot welding system includes a large servo-controlled gantry equipped with two 8-axis welding robots and the EasyPlan off-line programming software. PAWS, originally a Navy Advanced Technology Demonstration Project, was fully developed and demonstrated for shipyard use during the Navy Joining Center ManTech project in partnership with MARITECH. PAWS is designed to overcome the non-repetitive, small batch production and large dimensional variability problems that have limited the use of robotic welding for construction of Navy ships.



### ***Expected Benefits:***

Production implementation of PAWS provides Electric Boat with a robotic welding facility that will increase the fabrication efficiency and productivity for large submarine structures. This change in the manufacturing process benefits the Navy through realized cost savings.

## TIME LINE / MILESTONE

Start Date: September 1993

End Date: April 1998

## FUNDING

ManTech Investment: \$4.6M

## PARTICIPANTS

Edison Welding Institute (EWI)  
BWXT Technologies  
Northrop Grumman Newport News  
General Dynamics Electric Boat